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where the D 's represent the diameters of the pipes, and d the common diameter of their orifices. From this

$$D' = \sqrt{\frac{w' D^2 - w' d^2 + w d^2}{w}} = \sqrt{\frac{w'}{w} (D^2 - d^2) + d^2}.$$

$$= \sqrt{\frac{41}{\frac{1}{2}} \left[\left(\frac{2}{3} \right)^2 - \left(\frac{1}{2} \right)^2 \right] + \frac{1}{4}} = \sqrt{\frac{266}{3} \frac{5}{4}} = .96248 + \text{ inches.}$$

Also solved by G. B. M. ZERR, H. C. WILKES, and J. SCHEFFER.

61. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in Irving College, Mechanicsburg, Pennsylvania.

Insured my store for a/b th = $\frac{3}{4}$ th of its value, at $r=1\frac{1}{4}\%$; but soon afterward the store was burned down, and my loss over the insurance was $\$L=\$4150$. What was the value of my store?

I. Solution by HON. JOSIAH H. DRUMMOND, LL. D., Portland, Maine.

Construing the terms of this question as they are used in legal and insurance circles the solution is $\$4,150 \times 4 = \$16,600$.

But the proposer evidently intends to reckon the premium paid as a part of the "loss."

Then for every $\$4.00$ of value $\$3.00$ was insured at a cost of 3.75 cents, leaving $\$1.0375$ of loss.

Hence $1.0375 : 4 :: 4150 : 16,000$.

II. Solution by J. SCHEFFER, A. M., Hagerstown, Maryland.

The value of the policy is $\frac{a}{b} \cdot \frac{r}{100} x$, x representing the value of the store.

We have, therefore, obviously,

$$x \left[1 - \frac{a}{b} \left(1 - \frac{r}{100} \right) \right] = L, \therefore x = L \div \left[1 - \frac{a}{b} \left(1 - \frac{r}{100} \right) \right].$$

Substituting numerical value, we find $x = \$16,000$.

III. Solution by G. B. M. ZERR, A. M., Ph. D., Texarkana, Arkansas-Texas; P. S. BERG, Larimore, North Dakota; and A. P. READ, A. M., Clarence, Missouri.

Let s = value of store.

$$\text{Then } s - \frac{as}{b} = \left(\frac{b-a}{b} \right) s; \quad \frac{r}{100} \times \frac{as}{b} = \frac{ars}{100b} \therefore \left(\frac{b-a}{b} + \frac{ar}{100b} \right) s = L.$$

$$\therefore s = \frac{100bL}{100b - 100a + ar} = \frac{400(4150)}{100 + \frac{1}{4} \cdot 5} = \$16,000.$$

Also solved by EDWARD R. ROBBINS, and F. M. McGAW.